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File Code: 3420 **Date:** October 25, 2007
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Subject: Insect and Disease Conditions in the Huffer Forest Health Protection TSI Project Area

To: District Ranger, Mogollon Center, Coconino NF

On October 8, 2007, I met with Carol Holland, Analysis Group Leader, and Mike Manthei, Forest Silviculturist, to view and discuss insect and disease conditions in the proposed FY 2008 Huffer Forest Health Protection Project area. This letter describes bark beetle and dwarf mistletoe infestations, general stand conditions, and makes recommendations to minimize impacts caused by observed insects and disease.

Existing Conditions

The Huffer fire burned approximately 1,000 acres of ponderosa pine forest in June 1977. Following the fire, dead trees greater than 10 inches in diameter at breast height (dbh) were salvaged on approximately 847 acres and live trees with more than half of the live crown infected with southwestern dwarf mistletoe were removed. Uninfected and lightly infected trees were retained to provide shelter for planted seedlings and as a seed source for natural regeneration. The more severely infected trees were removed to reduce inoculum potential that could infect and impact regeneration, since dwarf mistletoes spread fastest from overstory trees to nearby regeneration. In 2007, infected overstory trees were recently removed on approximately one-half of the project area.

Nearly 400 acres were identified as being overstocked with trees less than 9 inches dbh and infected with dwarf mistletoe. Average stocking is about 300 trees per acre and dwarf mistletoe infection is light to moderate and patchy. Low levels of ips bark beetle caused mortality of small diameter trees was observed in the project area. The primary objective of the FY08 Huffer project is to promote the growth of ponderosa pine while reducing the impacts of bark beetles and dwarf mistletoe infection.

Treatment Options

The typical focus of managing mistletoe is to reduce the impacts of mistletoe infection on forested sites. Mistletoe management is a continuous process. New dwarf mistletoe infections take 3- to 5-years (latent period) before producing aerial shoots, so not all infection can be detected and removed during one treatment. At least one treatment will be needed 5 to 10 years after an initial treatment and can be accomplished during regularly scheduled silvicultural or prescribed fire treatments.

Several features of dwarf mistletoes make them ideal candidates for cultural management[i]:

- Dwarf mistletoes require a living host to survive. Mistletoe dies when an infected tree or branch is cut.

- Dwarf mistletoes are commonly restricted to a single host species or a group of closely related species. Non-host species can be favored during stand treatments.

- Dwarf mistletoes have fairly long life cycles and slow spread rates.

- Spread rates average only 1 foot per year. Although birds contribute to long-distance dispersal of seeds, this is rare and of little practical significance from a control perspective.

- Southwestern dwarf mistletoe-infected ponderosa pine trees are generally easy to detect due to the presence of yellow-orange shoots and witches' brooms. Trees in heavily infected stands show signs of short stature, decline, and mortality.

Managing dwarf mistletoe is difficult in stands under uneven-age management because younger trees become heavily diseased from seeds showering down from infected overstory trees. Initially, all infections in the young stand develop directly from seeds produced from overstory trees. Then there is a transition period when infections in the young stand begin to produce seeds that further infect the stand. Subsequently, infection in the young stand progresses outward beyond the range of the seeds produced in the overstory stand. Researchers[ii] [iii] have found nearly all infection in 20 year old stands was found to be attributable to seed produced in the overstory with 80 percent of infected seedlings found within 35 feet of infected overstory trees. In 50-year-old trees, lateral spread accounted for about one-half of the spread in open stands and one-third of the total in dense stands, with distances from the original overstory seed source reaching nearly 80 feet and 65 feet, respectively.

If uneven-aged treatments are to be applied in dwarf mistletoe infected stands, the sites should have very low levels of mistletoe and the mistletoe dispersed in defined patches. Group selection could be used to effectively remove infected trees and limit spread.

Prescribed burns can also be used to reduce dwarf mistletoe infection levels. Heavily infected trees have been shown to have reduced post-burn survival rates compared to lightly infected or non-infected trees[iv] [v]. Limbs located in the lower crowns of trees are killed during fire. Since dwarf mistletoe infections are generally more abundant in the lower crowns of infected trees, infection levels are decreased by the death of lower limbs.

Recommendations

Treatments to mitigate mistletoe impacts are typically integrated with other treatment activities such as reducing stand susceptibility to fire or insect outbreaks. Based on stocking levels, dwarf mistletoe infection levels, and stand composition, sanitation treatments appear to be an effective means of growing healthy trees in the Huffer Project area. The reduced infection levels and decreased densities should lessen the impact of disease and ips bark beetles on residual trees. Latent dwarf mistletoe infections are expected to be visible in about 5 years and can be managed in subsequent cutting cycles.

Moderately infected stands that are adequately stocked can be thinned by targeting the more severely infected trees while also emphasizing the most vigorously growing trees. Increasing

space between trees helps limit spread because seeds of dwarf mistletoe are explosively released and typically travel 10 to 40 feet from a fruit bearing plant. This reduces infection levels while still allowing trees to grow to maturity.

Uneven-aged treatments should only be considered in non-dwarf mistletoe infested or lightly infested stands that have well defined infection patches in which group selection can be used to target the removal of infected trees. Even-aged treatments are recommended in moderately to heavily dwarf mistletoe infected stands. Regardless of the emphasis on even-aged or uneven-aged stands, monitoring for follow-up treatments in 5 to 10 years is recommended.

Our office recommends that slash be generated between late summer and the end of December, if possible, in order to lessen the buildup of ips bark beetles. Slash piles should be placed in stand openings as much as possible and the largest diameter slash put on the outside of the pile to promote quick drying. Tepee style slash piles are made with branches and small-diameter slash in the middle and the larger diameter material on the outside.

If you have any questions regarding this evaluation, please call Mary Lou Fairweather at (928) 556-2075.

/s/ Mary Lou Fairweather
MARY LOU FAIRWEATHER
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Zone

cc: Carol J Holland
Michael Manthei
Debra Allen-Reid
John Anhold

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[i] Johnson, David W.; Hawksworth, Frank G. 1985. Candidates for control through cultural management. In: Loomis, Robert C; Tucker, Susan; Hofacker, Thomas H. Insect and disease conditions in the United States, 1979-83: What else is growing in our forests? Gen. Tech. Rep. WO-46. Washington, DC: U.S. Department of Agriculture, Forest Service, State and Private Forestry, Forest Pest Management: 48-55.

[ii] Gill, L.S. and F.G. Hawksworth. 1954. Dwarf mistletoe control in southwestern ponderosa pine forests under management. Jour. Forestry 52: 347-353.

[iii] Hawksworth, F.G. 1961. Dwarf mistletoe of ponderosa pine in the Southwest. Tech. Bull. 1246. USDA, Forest Service, Rocky Mountain Forest and Range Experiment Station. 13p.

[iv] Alexander, M.E. and F.G. Hawksworth. 1976. Fire and dwarf mistletoes in North American coniferous forests. Jour. Forestry. 74 (7): 446-449.

[v] Conklin, D.A. and W.A. Armstrong. 2001. Effects of three prescribed fires on dwarf mistletoe infection in southwestern ponderosa pine. USDA Forest Service, Southwestern Region, Forestry and Forest Health. R3-01-02. 17 p.